

Radon Risk: A Global Estimate of Radon's Contribution to Lung Cancer

Nate Seltenrich

<https://doi.org/10.1289/EHP4169>

Radon gas can seep into homes through cracks in floors and foundations. Even for people who have never smoked a cigarette, exposure to radon and its decay products can lead to lung cancer.^{1,2} Smoking compounds the risk, but according to new estimates published in *Environmental Health Perspectives*, radon exposure itself may be responsible for 14–17% of lung cancer cases and 3% of all cancer mortality in the 66 countries for which national data on radon exposure are available.³

The researchers' data covered the year 2012. They used three models for their estimates because of uncertainty about which model is best. Although estimates were similar for the three models, they were not identical. The estimated contribution of radon to lung cancer risk varied widely by country, with the variation influenced by tobacco smoking rates, geology, and home characteristics (for instance, a dwelling's airtightness or the floor area in contact with the ground), says lead author Janet Gaskin, a PhD candidate in the School of Epidemiology and Public Health at the University of Ottawa.

Radon had the highest estimated impact in Armenia, leading to 29–30% of all lung cancer cases and about 6% of all cancer

deaths. Meanwhile, Japan had some of the lowest numbers, with the gas estimated to have caused about 4% of lung cancer cases and less than 1% of all cancer deaths. Among other large nations, these estimates were approximately 12–16% and 4% for lung cancer and all cancer deaths, respectively, for China; 13–17% and 3% for Russia; and 9–13% and 3% for the United States, where approximately 21,000 people may have died in 2012 from lung cancer attributable to radon exposure.

"In the United States, I consider radon exposure the leading environmental cause of cancer mortality," says longtime radon researcher and University of Iowa professor Bill Field, who was not involved with the research but has collaborated in the past with senior author Daniel Krewski of the University of Ottawa. The new paper represents one of the first global estimates of lung cancer risk attributable to radon exposure, Field says. It was made possible by a growing body of data on residential radon levels worldwide.

But the data for the 66 countries included in the analysis may vary in quality and reliability. The authors point out that relatively few countries have conducted a population-representative



Radon gas is constantly flowing up through soil and rock. It can seep into homes through cracks in floors and foundations; without sufficient air exchange, it can accumulate in indoor spaces. But because radon cannot be seen, smelled, or tasted, people often do not realize they are inhaling the carcinogen. Image: © Mary Perry/Alamy Stock Photo.

national survey, which requires investigators to conduct long-term radon measurements in hundreds or thousands of randomly selected dwellings.

More and better national data continue to become available, says Gaskin. In the meantime, the nonprofit Conference of Radiation Control Program Directors has issued guidance urging health care providers to discuss radon exposure with their patients.⁴ In addition, radon experts and government agencies, including the U.S. Centers for Disease Control and Prevention,⁵ recommend that individuals perform their own tests. “One house can be fine, and a neighbor’s house can be terrible,” Gaskin says. “That’s why we encourage everyone to test. There’s really no way around testing.”

Fortunately, she adds, radon in indoor environments is relatively easy to reduce to minimal levels, even if it cannot be eliminated altogether. Mitigation typically involves installing sealed piping that is connected to the area beneath the lowest level of the building. An inline fan depressurizes the soil, then sucks in the radon gas and vents it to the outdoors.

Colorado School of Public Health dean Jonathan Samet, another longtime radon researcher who was not affiliated with the study but also has collaborated with senior author Krewski, says the new paper represents a step forward for a decades-old field that has generated its share of controversy. Today, Samet says, the science of the relationship between radon and lung cancer is essentially settled^{6,7}—and its message is clear.

“The story is that if you look around the world, there is a substantial burden of lung cancer from radon,” Samet says. “Radon is one of the few environmental carcinogens that we can easily

measure and actually do something to reduce exposure where it’s appropriate.”

Nate Seltnerich covers science and the environment from the San Francisco Bay Area. His work on subjects including energy, ecology, and environmental health has appeared in a wide variety of regional, national, and international publications.

References

1. U.S. EPA (Environmental Protection Agency). Health Risk of Radon [Website]. Washington, DC:U.S. EPA (updated 27 August 2018). <https://www.epa.gov/radon/health-risk-radon> [accessed 21 December 2018].
2. American Cancer Society. Radon and Cancer [Website]. Atlanta, GA:American Cancer Society (updated 23 September 2015). <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/radon.html> [accessed 21 December 2018].
3. Gaskin J, Coyle D, Whyte J, Krewski D. 2018. Global estimate of lung cancer mortality attributable to residential radon. *Environ Health Perspect* 126(5):057009, PMID: 29856911, <https://doi.org/10.1289/EHP2503>.
4. Conference of Radiation Control Program Directors, Inc. 2014. Reducing the Risk from Radon: Information and Interventions: A Guide for Health Care Providers. Frankfort, KY:Conference of Radiation Control Program Directors, Inc. <http://www.radonleaders.org/resources/reducingtheriskfromradon> [accessed 21 December 2018].
5. U.S. CDC (Centers for Disease Control and Prevention). Protect Yourself and Your Family from Radon [Website]. Atlanta, GA:U.S. CDC (updated 8 January 2018). <https://www.cdc.gov/features/protect-home-radon/index.html> [accessed 21 December 2018].
6. WHO (World Health Organization). 2009. WHO Calls for Tighter Standards on Indoor Radon [Press Release]. September 2009. Geneva, Switzerland:WHO. http://www.who.int/phe/radiation/background_radon/en/ [accessed 21 December 2018].
7. WHO. 2009. “WHO Handbook on Indoor Radon: A Public Health Perspective.” Geneva, Switzerland:WHO. http://www.who.int/ionizing_radiation/env/9789241547673/en/ [accessed 21 December 2018].